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ABSTRACT

The purpose of this study was to investigate the effect of focus (subject, object, and possessive) and embedding position (center vs. right) on kindergarten and second-grade subjects' responses to relative clauses. Twenty kindergarten and 20 second-grade children served as subjects. The subjects were middle-class, Anglo children who had not begun their reading programs. An equal number of boys and girls were included. The students were tested individually, the total testing time per child being approximately 15 minutes. The subjects were tested for accuracy and latency of response in 36 trials containing examples of six sentence types. From the data collected, it was concluded that second-grade children gave significantly more correct responses than kindergarten children, but they did not make their decisions any more quickly. All subjects responded more accurately to right-embedded than to center-embedded relative clauses, and they responded more quickly in making their right-embedded choice. Children from both groups responded more slowly and less accurately when the subject-verb-object search was disrupted by the relative clause. (TS)

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THE YOUNG CHILD'S COMPREHENSION OF RELATIVE CLAUSES

Evelyn Hatch

ABSTRACT

This study investigated the effect of three focus levels (object, subject, and possessive) and two embedding positions (center vs. right) on kindergarten and second grade subjects' responses to relative clauses. Subjects were tested for accuracy and latency of response in 36 trials containing examples of six sentence types. The results are examined in relation to two main strategies of interest in the field of child language comprehension: 1) the Subject-Verb-Object Search Strategy, and 2) the Minimal Distance Principle.

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THE YOUNG CHILD'S COMPREHENSION OF RELATIVE CLAUSES

Introduction

Relative clause structures include a variety of sentence types. This study investigated three focus levels and two embedding positions.

A number of previous studies have looked at the child's acquisition of relative clauses. Slobin (1967) used an imitation technique with one subject, appropriately named Echo, who gave some evidence of comprehension with relative clauses of certain types. These relatives were repeated as conjoined sentences:

Model: Mozart who cried came to my party.
Echo: Mozart cried and he came to my party.

Relatives with who-deletion were beyond Echo's ability to reproduce:

Model: The boy the book hit was crying.
Echo: boy the book was crying.

Focus on the relative clause and position were not considered since relative clauses were only one small part of the corpus elicited.

Gaer (1969) tested the young child's comprehension of sentences with a picture identification task. No significant difference was found in the child's comprehension of sentences with relative clauses following the subject, following the object, or two relative clauses. Scores, however, for three-, four-, and five-year-olds hovered around the 50-60% (50% being chance) level. Pictorial representations were not clearly adequate for the test purpose of this study.

Brown (1970) looked at subject and object focus with preschool subjects. Again the task was picture identification. Significant differences were found with lower scores for object focus especially

when the relative clause followed the subject. Difficulty of three relative pronouns was also investigated.

The present study is an extension of the Brown study. Three levels of focus--object focus, subject focus, and possessive focus--were investigated with two groups of children (either kindergarten/2nd grade or first grade/third grade). Embedding (center vs. right) was also considered.

In the four reading series investigated in Hatch (1969) the SWRL readers alone included relative clauses in the 1st year level (both Mod 1 and Mod 2); the other series included relative clauses in 2nd year levels. Examples from the SWRL materials showed a variety of focus types and embedding positions:

(SF-RE) She needs dolls who will run and play. (12.11)

(SF-CE) Then a bee who was in the weeds on the hill ran into the box. (2.7)

(OF-RE) She sees the ball that we hit. (5.17)

(SF-RE) He is putting them up next to a ship that has sunk. (Fantasy #2)

There are two main strategies of interest in the field of child language comprehension. The first of these is the Subject-Verb-Object Search Strategy (S-V-O) and the second is the Minimal Distance Principle (MDP).

Subject-Verb-Object Search Strategy

Slobin, Bever, and others have hypothesized that children develop a strong Subject-Verb-Object Search Strategy in their processing and recall of English sentences. Echo for example would abstract S-V-O relationships in scrambled sentences:

Model: the man the boy the book hit tore who
Echo: boy the man tore the book who

This strategy seems to have been employed in the who-deletion example given above as well. Bever (1969) found that young children frequently interpreted passive as S-V-O sentences perhaps because of the power of the S-V-O pattern. If the search hypothesis is correct, children should find sentences where the S-V-O relationship is readily apparent the easiest to process and recall. If the relationship is not evident, the sentence should be more difficult. If the hypothesis holds, children should comprehend right-embedded relative clauses much more easily than center embedded where S-V-O order is disrupted:

Easy: S-V-O + relative (The girl followed the boy that carried the dog.)
Difficult: S + relative V-O (The girl that carried the dog followed the boy.)

Minimal Distance Principle

The Minimal Distance Principle as described by Chomsky (1970), Cromer (1970), and others showed that the young child frequently used the closest noun as subject for the following verb or as a referent for a following pronoun whether or not it was the appropriate choice. Chomsky, for example, found that children even over the age of five had difficulty with sentences violating the MDP like "Pluto promised Mickey to dance," where they interpreted Mickey to be the dancer. They had no difficulty interpreting sentences like "Pluto told Mickey to dance," where Mickey was the dancer and the MDP held. Cromer's study upheld Chomsky's findings, showing that only children over 6.8 were consistently able to correctly identify the subject of the infinitive.

Relative clause focus allows us to test the MDP by looking at the child's choice for the relative pronoun referent. Subject focus which applies the MDP to the relative pronoun should be easier than object focus where the pronoun referent violates the MDP. The MDP is also violated in the identification of the relative pronoun referent in the possessive focus type. Possessive should be the most difficult sentence type since it is complicated by two additional factors. To make the sentences conform to the S-V-O pattern, the possessive is also object focus. Pronoun reference has also been complicated; one NP must be converted to a relative.

Subject focus

"The girl hit the boy that stole the ball."
^{1}SVO ^{2}(SVO) $O_1 = S_2$, MDP holds.
Girl hit boy (boy stole ball)

"The girl that stole the ball hit the boy."
^{1}S ^{2}(SVO) VO $S_1 = S_2$, MDP holds.
Girl (girl stole ball) hit boy

Object focus

"The girl stole the ball that the boy hit."
^{1}SVO ^{2}(SVO) $O_1 = O_2$, MDP violated.
Girl stole ball (boy hit ball)

"The boy that the girl hit stole the ball."
^{1}S ^{2}(SVO) VO $S_1 = O_2$, MDP violated.
Boy (girl hit boy) stole ball.

Possessive focus

"The girl hit the boy whose ball she stole."
^{1}SVO ^{2}(SVO ^{3}[SVO) $O_2 = O_3$, $O_1 = S_3$, $S_1 = S_2$, MDP violated.
Girl hit boy (girl stole ball [boy owns ball])

"The boy whose ball she stole hit the girl."
$^{1}S\ ^{2}(SVO\ ^{3}[SVO])\ VO \quad S_2 = O_1,\ O_2 = O_3,\ S_1 = S_3$, MDP violated.
Boy (Girl stole ball [boy owns ball]) hit girl.

Purpose

The purpose of this study is to investigate the effect of focus (subject, object possessive) and embedding position (center vs. right) on kindergarten and second grade subjects' responses to relative clauses. The first prediction, based on the S-V-O search strategy, was that center embedded relatives would be more difficult than right embedded. The second, based on the MDP, was that subject focus would elicit more correct responses than object focus and that responses to possessive focus would be the least accurate.

Method

Subjects

Twenty kindergarten and 20 second grade children served as subjects. The subjects were socioeconomically middle-class, Anglo children (white, monolingual). They had not begun their reading program. An equal number of boys and girls were included.

Materials and Procedure

Students were tested individually. Total testing time per child was approximately fifteen minutes.

Following a short training session in which the S was acquainted with the machine and tested for simple conjoined sentences, six examples of the six sentence types were presented via 36 Language Master tape

cards. The 36 trials contained examples of the 6 sentence types presented below.

	Relative Clause Type Embedding	Focus	
1)	RE	SF	The girl hit the boy who/that stole the ball.
2)	CE	SF	The girl who/that stole the ball hit the boy.
3)	RE	OF	The girl stole the ball that the boy hit.
4)	CE	OF	The boy who/that the girl hit stole the ball.
5)	RE	PF	The girl hit the boy whose ball she stole.
6)	CE	PF	The boy whose ball she stole hit the girl.

On hearing the stimulus sentence, the S was required to choose which of two projected pictures correctly represented the sentence. Accuracy and latency of response were both measured.

Vocabulary for the sentences was chosen from Rinsland's list. Thirty-six sentences were written with 6 versions of each so that the child did not receive more than one form of each sentence. All sentences were controlled for syntax and both matrix and relative clause were S-V-O in form. Nouns were reversible. Only sentences that could be clearly pictures were used.

Order of presentation of the sentence types within the 36 trials was randomized. Five orders of the randomized sentences were presented to an equal number of boys and girls who were assigned to each order.

Design

Each S received 6 versions of each of the 6 clause types. Half of the Ss received sentences using who as the relative pronoun and the other half received sentences with that. A separate anaiysis was run before collapsing the data to make sure the relative pronoun itself did not contribute to sentence difficulty.

An overall analysis of variance was run. The 2 x 3 x 2 design included subject groups (kindergarten vs. 2nd grade), focus (subject focus vs. object focus vs. possessive focus) and embedding (center vs. right embedding).

Results and Discussion

The data on accuracy and latency measures are presented in Table 1. The latency readings for correct responses, scored to the nearest tenth of a second have been converted to geometric means.

A separate 2 x 3 x 2 analysis of variance was run for each measure. The results are shown in Tables 2 and 3.

Looking first at the two age groups tested, second grade children gave significantly more correct responses than kindergarten children, but they did not make their decisions any more quickly. All Ss responded more accurately to right embedded relative clauses than to center embedded and they responded more quickly in making their right embedded choice. Both measures then support the S-V-O Search Strategy. Children from both groups responded more slowly and less accurately when the S-V-O search was disrupted by the relative clause.

The effect of the MDP, however, is more difficult to assess. Contrary to expectations, Ss responded least accurately to subject focus and most accurately to possessive focus. This is exactly opposite of what the MDP would predict. The latency readings, however, show that while highest accuracy was obtained for possessive focus, it was this choice which took the children longest to make. Ss made their choices for subject focus fastest, then for object, and took the longest time to make up their minds about possessive focus.

TABLE 1

SUMMARY TABLE OF MEAN CORRECT RESPONSES AND GEOMETRIC MEAN LATENCIES OF CHILDREN'S REACTIONS TO RELATIVE CLAUSES

Relative Clause Type	Accuracy		Latency (sec.)	
	Kindergarten	2nd Grade	Kindergarten	2nd Grade
Right Embedded				
Subject Focus	3.867	4.600	1.934	1.843
Object Focus	4.200	4.933	2.229	2.019
Possessive Focus	[illegible].767	5.067	2.107	1.877
Center Embedded				
Subject Focus	3.233	3.700	1.386	1.734
Object Focus	3.067	4.500	2.548	2.584
Possessive Focus	3.900	4.600	2.740	2.824

TABLE 2

ANALYSIS OF VARIANCE ACCURACY OF CHILDREN'S RESPONSES TO RELATIVE CLAUSES

Source	df	MS	F
Between			
Groups (G)	1	43.403	35.643**
$Error_{bet}$	58	1.218	
Within			
Embedding (E)	1	53.669	49.813**
G X E	1	1.003	0.931
$Error_{E}$	58	1.007	
Focus (f)	2	16.469	14.667**
C X F	2	1.953	1.727
$Error_{F}$	116	1.131	
E X F	2	.353	.315
G X E X F	2	1.303	1.163
$Error_{EF}$	116	1.121	

**$p \leq .01$

TABLE 3

ANALYSIS OF VARIANCE FOR LATENCY OF CHILDREN'S RESPONSES TO RELATIVE CLAUSES

Source	df	MS	F
Between			
Groups (G)	1	.106	.002
$Error_{between}$	58	4.632	
Within			
Embedding (E)	1	8.152	11.359**
G X E	1	2.494	3.475*
$Error_{E}$	58	.718	
Focus (F)	2	16.532	37.324**
G X F	2	.438	.988
$Error_{F}$	116	.443	
E X F	2	9.845	21.769**
G X E X F	2	.709	.157
$Error_{EF}$	116	.452	

*$p \leq .05$
**$p \leq .01$

None of the interactions on the accuracy response measure were significant. In the latency data, however, two interesting interaction patterns did appear. First, in the Group X Embedding interaction, kindergarten subjects responded almost as quickly to center embedded relatives as to right, though their scores for center embedded choices were less frequently correct than were second grade choices. Second grade Ss took longer to make their correct decisions about center embedded relatives than did the kindergarten children (see Figure 1). The only apparent explanation for this finding is that the older children were truly attending to the task while kindergarten children may have been simply playing a push-the-lever game.

The Focus X Embedding interaction shows that latencies for all three focus types are fairly steady for right embedded relatives. The latencies for the more difficult center position are widely spread (see Figure 2). Correct responses for subject focus in the center position were made very rapidly. Object focus took much longer, and decisions about the possessive focus longer still.

The S-V-O Search Strategy can account for most of the difficulty in reqponse to relative clauses. If relative clause placement interrupts the S-V-O search, Ss will take longer to make their interpretation and fewer of their choices will be correct. Furthermore, if the relative clause itself is also a forward-running S-V-O, as is the case in subject focus, children are more likely to respond quickly than if it is not. The MDP is not strictly validated by this experiment. The latency responses showed that Ss responded more rapidly when the MDP was applied, and more slowly when it was violated. However, the accuracy of responses

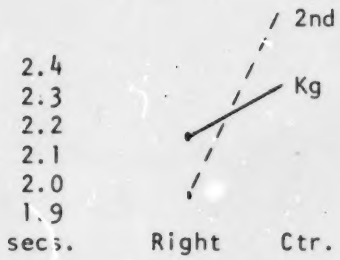

Figure 1. Group X embedding interaction.

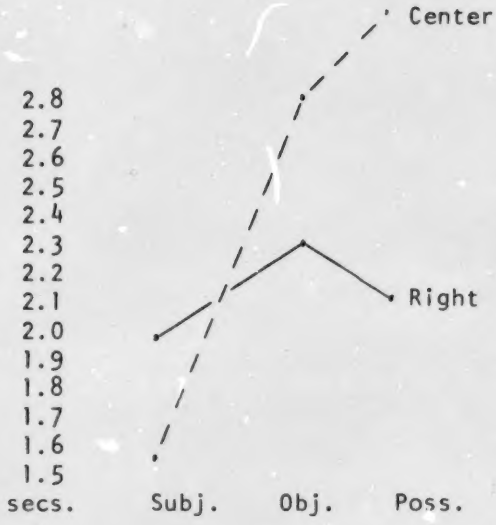

Figure 2. Focus X embedding interaction.

was not greater when the MDP was applied; in fact, it was higher when the principle was violated.

It might be argued that the latency data is the "real" measure and that more devious and less controlled experimentation would obtain stronger data to support the MDP.

With this after thought, the E showed the pictures from which the slides had been made to 10 kindergarten and 2nd grade children from a comparable school. Sentences were taped on Language Master cards and the Ss fed the cards into the Language Master. The S then showed the E which picture was "right" for what the card said. The Ss were allowed to replay the card as often as they wished. The mean scores for this procedure are shown in Table 4. The data here seemed to substantiate the MDP. The evidence, however, is tentative at best since the procedure was so loose. Subjects quickly assumed this was a "real" game and a great deal of fun. They chattered about the machine, the details of the pictures, the testing room, their teachers, and their peers. They frequently changed their minds about which picture choice was correct, sometimes so frequently that it was difficult to be sure which was the final choice. Ss were not equally reinforced. If they asked if they were right, they were told. Ss frequently explained why they were wrong by pointing out the difference in the two pictures. If they didn't ask, they weren't told, though smiles and frowns may unintentionally have balanced the verbal reinforcement and training.

On the basis of this experiment, it was suggested that beginning reading materials limit the use of relative clauses to sentence-final position. Object focus and possessive focus clauses should be sequenced

TABLE 4

RESPONSES OF 10 CHILDREN TO RELATIVE CLAUSE TYPES

Relative Clause Type	Mean Score	
Right Embedding		
Subject Focus	.79	Apply MDP
Object Focus	.64	Violate MDP
Possessive Focus	.65	Violate MDP
Center Embedding		
Subject Focus	.56	Apply MDP
Object Focus	.52	Violate MDP
Possessive Focus	.50	Violate MDP

following subject focus. When relative clauses are used following the subject, these should be limited to subject focus clauses only.

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